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chick so intelligent as to carry out an act so complex in such a perfect way as it does on the very first occasion as the result of 'teaching?' Surely no one will deny that sucking is an instinctive act, yet a newly born mammal sucks only when its lips come *in contact* with the teat. Is not the case very similar with the chick? The only difference is that the chick is slower to *recognize* water than food, but as soon as the beak touches water it drinks and there is no teaching about it. Considering how seldom a fowl drinks, yet pecks all day long at particles of food, it is not surprising that the chick is slower to recognize water (drink) than food. But it is one thing to say that a chick learns to recognize drink and another to affirm that it learns to drink. The process of drinking is quite as perfect as that of eating from the very first, if not more so, for a chick at first often misses what it pecks at and fails to convey the object into its mouth in other cases, though it may touch it.

The view that instincts are perfect from the first and undergo no development from experience, I believe, after much observation, to be as erroneous as it is ancient.

Instinct is never, perhaps, perfect at first, and so far as I can see, could not be owing to general imperfect development in the animal of motor power, the senses, etc. A young puppy will suck anything almost that can pass between his lips, as a chick will peck at any light spot or object if small, be it food or not. My own records abound in observations that amply prove the position taken, and while my experiments and observations on birds are in the main in accord with those of Prof. Morgan so far as I know them, I cannot but believe, if I have correctly understood his views as reported at the New York meeting, that he has misconceived or overstated the case under consideration.

The subject of heredity is too large to enter upon now. I may say, however, that my researches in comparative psychology and especially in that part bearing perhaps most closely on the question, psychogenesis, do not incline me to believe any the more in that biological *ignis fatuus*—Weismannism.

WESLEY MILLS.

MCGILL UNIVERSITY, MONTREAL.

[Professor Morgan's observations agree with those of Professor Mills and others. A chick swallows water instinctively, but must be taught to drink by example or by accident. The chick might die of thirst in the presence of water, as the sight of the water does not call up the movements of pecking at it, as do food and other small objects. The mother hen replaces natural selection, and the action, though continually practiced by the individual, has not become instinctive, because it has not a selective value. Professor Morgan's argument seems to be satisfactory. If actions which occur but once in the lifetime of the individual (*e. g.*, the nuptial flight of the queen bee) are thoroughly instinctive, and others which are practiced continually by the individual do not become instinctive in the race, we can scarcely regard instincts as hereditary habits, but must rather attribute them to variations, fortuitous or due to unknown causes, and preserved by natural selection.—THE WRITER OF THE NOTE.]

THE CHANCE OF OBSERVING THE TOTAL SOLAR ECLIPSE IN NORWAY.

EDITOR OF SCIENCE: As unusual facilities are being offered to visit northern Norway to observe the total solar eclipse on the 9th of next August, of which many American and English astronomers and tourists will doubtless take advantage, it seems desirable to make known the following data relating to the cloudiness, and the consequent probability of seeing the eclipse there. They have been communicated to me by Prof. H. Mohn, director of the Norwegian Meteorological Institute, who prepared them for the Swedish Astronomical Association.

Vadsö, which has been recommended as the most accessible station near the central line of totality and will be the rendezvous of several parties, is situated in Latitude 69° 52' North and Longitude 29° 45' East of Greenwich. According to the British Nautical Almanac, the total phase, lasting 1m 47s, here occurs at 15h 58m Greenwich time, or 5h 55m local mean time, which is 2 hours after sunrise. The sun's altitude is 15°.

Professor Mohn writes: For Sydvaranger, the nearest place to Vadsö at which meteorological observations have been made, the amount

of cloud on a scale of 0 to 10, and the chance in percentages of its occurrence are as follows:

August 8th, 8 P. M.		August 9th, 8 A. M.	
Amount of Cloud.	Chance.	Amount of Cloud.	Chance.
10	45.5	10	45.5
8	13.7	9	9.1
7	4.6	8	4.6
5	4.5	7	9.1
3	9.1	6	4.5
2	4.5	4	4.6
0	18.2	3	4.5
		2	9.1
		0	9.1
100.1		100.1	

"In Vadsö there is a telegraph station, and time signals are to be had from the observatory in Christiania. The latitude and longitude have been determined with all possible accuracy. Sydvaranger lies on the south side of the Varangerfjord and Elvenes is the name of the posting station. Vardo, lying on the north side, is not to be recommended, having too often fog or clouded sky. In the interior of Finmarken the sun is lower than at Varangerfjord."

Although the astronomical conditions of low altitude of sun and short totality are not good, yet the meteorological conditions just noted compare favorably with those of stations in Japan, where the eclipse occurs later in the day and totality lasts longer. As a basis of comparison for the chance of clear weather, it may be stated that here at Blue Hill, Mass., near the coast, at 8 A. M. in August the average frequency of cloudy weather (sky 8 to 10 tenths covered) is 50.0 per cent. and the average frequency of clear weather (sky 0 to 2 tenths covered) is 32.3 per cent.

A. LAWRENCE ROTCH.

BLUE HILL METEOROLOGICAL OBSERVATORY, February 20, 1896.

THE RÖNTGEN RAYS.

The following fact regarding the X-rays of Röntgen may be of interest:

I have found that it is possible to obtain a photographic image by these rays using a 'pin-hole camera,' having the aperture pierced in a piece of sheet lead backed with aluminum. The Crookes tube was illuminated by discharges from a Thomson high-frequency coil. The

photographs taken in this way show very distinctly the two electrodes, while the glass bulb, which appeared to be brightly illuminated to the eye, is scarcely perceptible. It would appear from this that nearly, if not all, the so-called X-rays proceed directly from the electrodes of the tube and not from the glass where this is acted on by the cathode-rays. It likewise affords further illustration of the rectilinear motion of the X-rays. Experiments are in progress with a broken current and also to study the effect of a magnetic field.

Previous observation had shown that the photographic effects were produced equally whether the cathode rays impinged upon the glass or upon other phosphorescent material (*e. g.*, arragonite) within the tube. It has also been noticed in experiments in this laboratory that the appearance of the tube to the eye affords no criterion of its efficiency in producing the X-rays; tubes showing but little fluorescence of the glass composing them often giving admirable photographic effects, which in some cases are obtainable even from a low-vacuum Geissler tube. But the rays producing photographic effects always appear to produce strong fluorescent effects on platino-cyanide of barium, so that the fluorescence of this affords an indication of the photographic efficiency of the radiations emitted from the tube.

RALPH R. LAWRENCE.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY,
BOSTON, February 26, 1896.

RÖNTGEN RAYS PRESENT IN SUNLIGHT.

IN the course of a series of experiments on the so-called Röntgen or X-rays, the undersigned have secured evidence of the presence of these rays in sunlight, and have been able to reproduce many of the phenomena ascribed to the X-rays, without the use of vacuum tubes or any other source of light or energy than direct sunlight.

Dr. Egbert was led on February 22d to place in a photographer's printing frame, an ordinary sensitive plate (Seed's No. 26), upon which was superimposed a positive lantern slide, and on this a shield of aluminium; which was then exposed to the direct rays of the sun for two hours, and the plate developed, when it was found that the aluminium shield had been transparent